27—40,000—6-11-28.

L. Sf. (1928) Department.

Pages 18 & 24

This SERIES.

G.O. No. 1015 G.H.

DATED 15-4-1929.

[Despatch Abstract.]

Malaria - Puttur Taluk, South Kanara District - Report communicated to Puttur Taluk Board for necessary action - Further report called for.

C.F. 30.

Public Health DEPARTMENT.

Received 3-MAR-1929 192 . Registered 192 .

SECRETARY TO GOVERNMENT LOCAL SELF-GOVERNMENT DEPARTMENT

Subject.

Report on malaria survey in Puttur taluk, South Kanara District - copy forwarded.

ECL

ENCLOSURES.
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R. No. 39-2/Mal.

Station Madras , Dated the 1st March 1929.

From (Name) Capt. N. R. Ubhaya D.P.H.,
(Designation) Ag. Director of Public Health, Madras.

To The Secretary to the Government of Madras,
Local Self-Government (Public Health) Department.

Sir,

I have the honour to forward an elaborate and interesting report of the Special Malaria Officer on 'Malaria Survey in Puttur taluk, South Kanara District.' It is clear from the report that a greater part of this taluk, particularly the submontane area, is very badly affected with the disease.

2. For an immediate relief of this serious condition of affairs I would urge upon the Government the desirability of giving effect to the recommendations of the Special Malaria Officer outlined in para 55 of his report with respect to the appointment of an Assistant to the District Health Officer, South Kanara, who will be in sole charge of the antimalarial operations. If Government

are

are in favour of this suggestion, I will only be too glad to send in definite proposals relating to the appointment. A second investigation during the febrile season may also be undertaken by the Special Malaria Officer with a view to incriminate the carrier species of anopheles mosquito in this area and to find out the ways and means of permanently eradicating the disease in a few selected villages.

3. The u.o. reference on the matter of investigation into the problem of malaria in Puttur (L.S.G.u.o.No.25424-1 D.2 P.H. dated 22nd June 1928) is returned herewith.

I have the honour to be,

Sir,

Your most obedient servant,

Capt.,D.P.H.,
Ag. Director of Public Health,
Madras.

PRR.
1-3.

REPORT BY TO GOVERNMENT
3 JAN 1929
GOVERNMENT DEPT

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Report on malaria survey in Puttur Taluk, South Kanara District.

1. In pursuance of G.O.No.2353 P.H. dated 7th November 1928, an antimalarial investigation was carried out in Puttur taluk between the 30th of November and 27th of December 1928.

2. The taluk of Puttur, once known as Uppinangadi taluk, occupies nearly a third of the South Kanara District on the south-east. The District of South Kanara itself lies along the west coast of the Presidency and includes in its area the long strip of country situated between the coastal line and the Western Ghats. It has a varying width of 20 to 50 miles depending on the extent to which the sea has receded from the long chain of ghats. The ghats also serve to demarcate the territories of Mysore and Coorg in the east and south-east. The northern and southern boundaries are formed by the North Canara District (Bombay Presidency) and Malabar respectively. While the coastal line on the east presents a somewhat monotonous picture to the eye with the sameness of barren beach and breaking water, the west coast is picturesque for the endless variety of its scenery presented by the bold cliffs that stand at varying heights and distances from the coast.

3. Puttur is the biggest taluk of the district covering an area of 1239.32 sq. miles. The country is a low plateau with an average altitude of 500 ft. above the sea-level and is broken up into numerous undulating bits of land by ridges of low height which are not more than about 200 ft. above the average ground level, so much so that it is not possible to demarcate an acre of even land anywhere. The green-clad cliffs of the Western Ghats surround the taluk on all sides except on the west where parts of the Mangalore and Kasaragod taluks separate it from the Arabian sea. The ranges of hills on the north and east separate the area from Mysore territory and that on the south from Coorg. The taluk is widest in the middle measuring about 50 miles from east to west and narrowest at the northern end where it is only about 10 miles wide. The average height of the ranges of hills running from north to south may be stated to be about 2,500 ft. while some of the interesting peaks rise to as great a height as 6,000 ft. 'Kudre Mukha,' a group of three peaks, named after its fancied resemblance to the face of a horse, is situated on the highest

scarp of a ridge of the western ghats facing Beltangady about 6,200 feet above the sea-level and commands a magnificent precipice of over 1,000 ft. Other peaks of importance are Kate Gudda (4,534) to the south of the Charmadi Ghat, Sisalkal (3,921) over the old Sishila Ghat, Subrahmanya (5,667) overlooking the Bisli Ghat and the well-known temple of Subrahmanya, and Ammadikal (4,261) near Neriya.

4. Communications in South Kanara District do not admit of easy and quick travelling. The railway runs along the coastal line to Kasaragod and Mangalore, the rest of the district having to be reached by carts or buses. For instance the town of Puttur itself, the headquarter station of the taluk, is 32 miles from Mangalore, the nearest railway station. Thanks however to public enterprise, through services by motor buses to parts of Mysore and Mercara and to other parts of the district are maintained. Nevertheless, the largest tract of country in the interior and to the east of Puttur can only be reached by carts and more often by foot only;--and, even then, the numerous streams lying on the main routes, which are mostly unbridged, cut off all communications during the heavy rainy months and during other parts of the year have to be crossed by cart, foot or by the boat.

5. The taluk seems with a continuous series of low ridges and hollows, the general slope being from east to west. Drainage is therefore naturally quite efficient and one rarely meets with a marsh or swamp in any part of the taluk. Numerous hill streams of crystal clearness and deceitful depths, wind their way between these ridges, until ultimately they join the main river of the taluk VIZ., Netravati. This river arises in the Ghats to the east of Kudre Mukha peak and the silvery line of its fall down the slopes of the cliffs is easily discernible from the Malavantiga valley--the northern most part of the taluk. It flows down the Bangadi valley past Beltangadi on beds of laterite rock, of which the soil of South Kanara is mainly composed, gathering force on its way by the junction of numerous smaller hill streams and 'holes', as the more important ones among them are called, such as Mundaje holé, Neriya holé and Sisila holé and so on. At Uppinangadi it is joined by another large river, the Kumaradhari which takes its origin in the Kumara Parvatam near Subrahmanya. The combined waters of the two rivers, still retaining

the name of Netravati, flow past Bantwal in Mangalore taluk and are discharged into the sea near Mangalore.

Another river, of smaller size, R. Payaswani takes its origin from the Coorg ghats near Sampaje and after a short course along the southern border of the taluk passes on to the neighbouring taluk of Kasaragod.

6. Climate:. Puttur taluk may be described to have an equable climate on the whole. . In early summer, the maximum heat which may reach 100° F. is tempered by the cooling effects brought about by evaporation of moisture from the soil and by the thick vegetation spreading over and at the foot of the hills. By the end of May or early June, when in other parts of the Presidency severe heat often laden with great moisture is experienced, rains set in and the daily maximum temperature falls down to bearable proportions. As one approaches the hills, the days are but little hot and the nights are pleasantly cold, although in winter months one feels inclined to have a covering. In places like Sampaje, Neriy and Charmadi which are close to the Ghats and which are surrounded by dense forests, the conditions of weather are very agreeable and pleasant. It is a pity that no meteorological observations are recorded in any part of the taluk.

7. Although the total rainfall in any year -- practically the whole of which occurs during June, July and August, the months of the principal monsoon of the west coast, VIZ., the south-west monsoon,--amounts to as much as 150 inches on the average, the country side is not generally subjected to dangers due to flooding, especially on account of the natural drainage of the soil and on account of the larger rivers with swollen waters and overflowing banks rapidly resuming their normal proportions. But now and again that part of the country which surrounds the confluence of the Netravati with the Kumaradhari has been inundated by the large volumes of the combined waters when the monsoon became unusually heavy and severe.

8. The hill streams flowing down easy gradients serve for purposes of irrigation. Commencing as copious springs at the head of a ravine, they go on winding in its wake as it widens out to join a valley which forms one green stretch of rice plots.

The

The upper slopes of the ravine are studded with cashewnut and jack trees, while, lower down, the sides are bordered with close-set plantations of arecanut trees interspersed with a few stately Sago or other palms. In a few places teak and black-wood are also grown, but, in the absence of facilities for transport as obtain in Malabar, timber growing in is on the decline in South Kanara. Pepper and cardamon plantations are also to be met with in some parts of the taluks.

9. Puttur taluk abounds in its forests which form nearly a fourth of its area. In former times regular deforestation by fire seems to have been resorted to and the resulting ash used as manure for rice cultivation. The cleared land itself was generally used for cultivating ragi or other dry crop. As time rolled on, there has been a certain amount of depopulation and consequent neglect of forests with the result that they have grown to such vast proportions that in many cases they extend quite near human habitations. And again the conservancy and reservation of forests in recent times has not a little contributed to their growth in such dangerous proximity to human dwellings. For one thing they afford shelter to wild animals which prey upon cattle and destroy the crops, for another, they are universally denounced by the people to be the cause of their severe malaria which is also claimed to be of comparatively recent prevalence. As will be referred to later in the report, this is also supported by our findings that the most highly endemic places are also those where reserved forests abound extensively.

10. The population of Puttur taluk is 193,779 according to the Census of 1921. More than 80% of these are Hindus. The Musalmans or Moplahs form about 10% of the population while the Christians and the Jains about 7% and 1% respectively. The principal languages of the taluk and the district are Kanarese, Tulu, Malayalam and Konkani, a modified form of the Mahratti language.

11. In Puttur taluk, villages are not generally denominated by the congregation of a number of houses and bazars over a well-defined site or plot of land. In fact there is no village site proper except in the case of larger towns like Puttur, Beltangadi, Uppinangad and Vittal. A landowner usually resides on his own estate and his tenants have their houses either on the holdings or on the waste land immediately adjoining. Each village extends several miles in length

and breadth, the houses lying scattered about and what commonly goes by the name of the village proper is only a collection of about half a dozen mud or other huts like the village bazar, post office or school, all of them lying on the main roads of communication. Housing conditions are tolerable only in so far as each individual has a habitation for himself and his family. The well-to-do landlord is also in a position to provide, in the majority of cases, a site or sites for his own tenants, each of whom raises a small tenement of his own. An ordinary tenement consists of a shed with mud-walls and a thatched roof. These huts are generally constructed along the slopes of ridges, bordering the paddy fields in the valley lower down. Every tenement has a varying amount of open land or yard in front and is well-shaded by the surrounding cluster of trees or large arecanut or other garden.

12. Agriculture is the mainstay of the people and rice the staple article of food and cultivation. Rainfall being plentiful, itself suffices for such lands as yield a single crop. The numerous hill streams some of which run full for a considerable time after the cessation of the monsoon serve to water the two-crop lands. Some of the more fertile valleys yield even a third crop in the year, which seems to thrive in the excessive dew-fall that obtains there. There are therefore no extensive irrigation works such as tanks in the taluk except in Kadaba where, in the absence of any natural streams in the vicinity, rain water is stored up in two or three places by putting bunds across some of the ridges and used for purposes of irrigation. In most places, however, water is diverted from the natural course of the streams by putting bunds across and taking it through channels for the garden lands adjoining the households where arecanut is cultivated in abundance. The Netravati river and its tributaries abound in such temporary anicuts which get washed off during the floods and are renewed year after year.

13. These side channels are innocuous as breeding places so long as they run full: but once the level of water in the main stream goes down and the current gets broken up, a series of small pools is formed along their course swarming with anopheles larvae

under

under the shelter of the marginal weeds and plants. Simultaneously a fair amount of water which overflows or leaks through these artificial bunds collects in the form of pools of varying dimensions on the rocky bed of the self-same streams lower down and serve as ideal spots for the breeding of dangerous anopheles mosquitoes.

14. It seems at first sight that tenures and natural circumstances being alike favourable, the ryots are in a position of comparative ease, comfort and prosperity. But at the same time a great part of the land that lies fallow beside the forest-clad-hill-land has a different tale to tell. Water is abundant and the soil is fertile; but these are not being utilised on account of dearth of labour resulting from the ravages of this dire disease.

15. On the whole socially and economically the people are comparatively better off than in other parts of the Presidency. They are certainly more kindly, more affable and better civilised. The average villager is a quite quiet-going person who respects authority and minds his own business and looks intently for his own well-being and prosperity.

16. Evidences of malaria: During the period of our stay which extended to a period of nearly a month, it was considered advisable to visit as many villages, which are known to be malarious, as possible with a view to study firsthand the individual problems that beset each village, leaving the question of carrying on at a future date a more intensive work at one or more selected spots, depending upon present data and findings. It was also proposed to go to some other villages which are known to be not so highly malarious for purposes of comparative study, so that, it may be possible to find out what determines the incidence of malaria in one place and its absence in another, while all the places are more or less identical in all other respects--topography, climate, soil and physical features. On the whole 50 villages were thus visited and for purposes of description they may be grouped into circles as shown in the following table along with other details of work done therein:

Name of group.	Villages in the group.	No. of children examined for spleen.	Number with enlarged spleen.	Spleen rate.	Splenic volume.	Average finger.	No. of smear examined.	Number infected.	Parasite rate.
Subramania.	Kulkunda Subramania Nalkuru Guttigar Kallmarapaltadka.	95	77	81	186	2.4	72	9	12
Kadaba.	Kodimbala Kadaba Kutrupadi Nujibaltila Ranjaladi.	190	97	51	182	1.8	75	6	8
Uppinangadi.	Uppinangadi	105	12	11	21	1.7	15	2	13
Hirebandadi.	Hirebandadi.	22	8	36	19	2.4	22	4	18
Golithatu.	Golithatu Bajathur Kokkada.	132	95	72	203	2.1	120	27	23
Hatyadka	Hatyadka. Sisila Shibaje.	50	41	82	101	2.5	40	6	15
Bangadi	Indabetu Bangadi Kadirudayavara	96	73	76	168	2.3	76	12	16
Malavantiga.	Malavantiga. Mittabagil	44	28	64	72	2.6	42	6	14
Neriya.	Neriya. Thotatadi.	80	73	91	178	2.5	60	12	15
Charmadi	Charmadi Kokkinje Chibidre	60	52	86	104	2.0	52	4	8
Mundaje	Mundaje Kalamanja	96	68	71	146	2.2	60	6	10
Dharmasthala	Dharmasthala Nidle Kanyadi	106	96	91	246	2.6	90	12	13
Ujre	Ujre	105	20	19	29	1.5	40	4	10
Laila	Laila Nada Navur	115	83	72	180	2.5	106	17	16
Beltangadi.	Beltangadi	132	21	16	46	2.2	36	2	1

Name of group.	Villages in the group.	No. of children examined for spleen.	No. with enlarged spleen	Spleen rate.	Splenic volume.	Average finger.	No. of smear examined	Number infected.	Parasite rate.
Badyar.	Badyar. Guruvayankere.	47	3	6	6	2.0	12	3	25
Puttur	Puttur	494	12	2	...	...	20	..	..
Vittal	Vittal	248	1	..	1	1.0	12	..	..
Kepu	Kepu Punacha	116	..	..	.	..	..	..	..
Bellare	Bellare Kalanja Aivarnadu.	80	30	37	52	1.7	47	4	9
Sullia.	Sullia.	73	14	19	23	1.6	28	2	7
Sampaje.	Aranthode Thodikana Sampaje.	262	167	64	334	2.0	84	9	11
		2,748	1071	39	2,297	2.1	1153	147	13

Group.	Types of parasites. Benign Tertian.	Quartan.	Malignant Tertian.	
Subramania.	2	3	4	
Kadaba.	4	2	0	
Uppinangadi.	1	0	1	
Hirebandadi.	3	0	1	
Golithattu.	14	11*	2	*Bajathur predominant in this type.
Hatyadka	1	4	1	
Bangadi.	5	4	3	
Malavantiga	3	0	3	
Neriya.	4	4	4	
Charmadi.	3	1	0	
Mundaje.	3	3	0	
Dharmasthala	2	8	2	
Ujre	2	1	1	
Laila.	3	12	2	
Beltangadi.	..	2	..	
Badyar.	2	..	1	
Puttur.	..	..	..	
Vittal	..	..	..	
Kepu	..	..	..	
Bellare.	..	2	2	
Sullia.	..	1	1	
Sampaje.	..	5	4	

17. As many as 2,748 children between the ages of two and twelve, of different castes and communities were examined. 1,071 or 39% were found to have enlarged spleen. This in itself is a pretty high figure and would constitute Puttur as an "endemic" area. But a closer scrutiny of the figures reveals a sadder picture for a larger part of the taluk. If one were to draw a line along the town of Puttur from north to south, one can easily discriminate that villages to the west of this line are not as malarious as those on the east of it. Whereas in the former only 13 children out of 858 or 1.5% showed evidences of enlarged spleen, in the latter 1,058 out of 1,890 or 56% had enlarged spleen. Or again if the figures for such bigger towns in the taluk as Puttur, Vittal, Beltangady and Uppinangadi are excluded, it is found that out of 1,664 children 1,025 or 60% have enlarged spleen. It will therefore be seen that the area to the west of Puttur and the bigger towns are comparatively healthy with a spleen index of less than 10% while at the other extreme, the villages lying immediately below the Ghats such as Dharmasthala, Charmadi, Subrahmanya, and Sampaje are the most highly endemic with a spleen rate of over 80%.

18. The average enlarged spleen works out to be about two fingers' breadth for the whole area varying from about 1.5 finger breadths to 2.6 finger breadths for individual groups of villages. Here again the greatest amount of enlargement occurs in the submontaine regions like Dharmasthala showing the greatest intensity of the disease there.

19. Parasite index: 1,153 slides were examined for malarial parasites and 147 of them were found infected. The parasite index generally follows the spleen rate and only serves to corroborate the findings made thereon. All the three varieties of the malaria parasite are met with. Infection with the malignant tertian does not appear to be as great or common as has been experienced in "endemic" areas in a few other parts of the Presidency. The predominating causative agent of the fever is either the quartan or the benign tertain both of which appear to be found in almost equal numbers. Unlike in other parts of the Presidency the extra-ordinary larger number of infections with quartan parasites is characteristic and strikes any observer that further investigations are necessary to elucidate factors governing the

this feature.

20. The parasite indices are low in proportion to the corresponding spleen rates. This is explained by the fact that our investigation coincided with the afebrile season of the year. On the other hand it appears to represent a more true picture of the endemicity of fever than what one may find in the febrile period. The sexual forms of the parasites (gametocytes) were more in evidence than the asexual forms (trophozoits). The febrile season actually ~~bxi~~ begins from February and its extent and severity goes on increasing as the water in the numerous streams or channels goes down leaving smaller or greater pools behind, the maximum intensity being reached in May, a few weeks before the onset of the south-west monsoon.

21. Mosquito survey: The water places consist only of the numerous hill streams and channels also called "holes" and the principal rivers mentioned in para 5. These were all running full during the period of our survey and consequently the mosquito fauna was not at its highest. The following species of anopheles were however bred out from the larval collections: A. subpictus, A. vagus, A. fuliginosus, A. pallidus, A. maculipalpis, A. karwari A. jamesi, A. listoni, A. jeyporiensis, A. barbirostris, and A. hyrcanus var. nigerrimus. A. listoni is, amongst them, the only one species definitely known to carry malaria while A. maculipalpis is a doubtful carrier. During the fever season this or other carrier species may be expected to be breeding in greater numbers and therefore a second survey may be necessary to determine them during that period. When dry weather conditions prevail and water in the stream is small in quantity, tiny stagnat pools are formed along the rocky beds and possibly give rise to the other and more dangerous carrier varieties of anopheles mosquitoes. Even now there were numerous pools collecting in small erosions on the rock where anopheline larvae were found in plenty although they were mostly only A. karwari, a non-carrier species. A. listoni was found in small numbers along the sides of slow running channels and in the more or less stagnant pools in the small bays formed along the course of the larger streams.

21. Hospital statistics: A statement showing the number of cases of malaria treated in the various dispensaries is put up below:

Malaria cases treated - month-war - in the various hospitals of Puttur taluk, South Kanara district during the years 1925 and 1926.

Month.	1925 Puttur.	Vittal.	Beltangady.	Sullia.	1926 Puttur.	Vittal.	Beltangady.	Sulli
January	240	3	886	205	243	40	800	246
February	288	11	692	211	260	60	682	272
March	490	47	915	255	338	64	753	276
April	726	103	1,030	244	354	62	843	347
May	741	95	1,093	266	365	37 45	963	430
June	1,200	149	1,306	689	346	[illegible]	994	386
July.	1,203	114	1,686	584	739	117	1,055	912
August	656	33	1,040	474	627	102	1,027	739
September.	278	25	708	284	419	99	888	496
October	178	27	591	377	314	63	834	303
November.	155	21	475	344	295	59	621	307
December.	200	26	671	277	303	37	671	269
	6,349	653	10,003	4,210	4,603	776	10,111	4,983

Malaria cases treated - month-wise - in the various hospitals of Puttur taluk, South Kanara District in the year 1927.

Month.	Puttur.	Vittal.	Beltangady.	Sullia.
January.	335	63	803	372
February	330	63	795	383
March	432	62	768	395
April	498	116	828	437
May	784	132	925	598
June	907	171	1,071	838
July.	1,235	237	1,380	843
August	887	104	906	721
September	534	58	618	464
October.	360	61	401	274
November	304	41	340	179
December	307	55	532	234
	6,920	1,163	9,480	5,718

Malaria cases treated - month-wise - in the various hospitals of Puttur taluk, South Kanara district in the year 1928.

Month.	Puttur.	Vittal.	Beltangady.	Sullia.	Sampaje.	Panja.
January	379	50	631	231		
February	420	60	687	211		
March	554	90	867	433		
April.	665	98	949	496		
May	759	96	1,115	311		
June.	660	102	1,008	760		
July	988	103	1,443	1,059	75 (14-7-28)	
August	887	83	1,263	769	250	510 (2-8-28)
September	542	45	..	685	127	410
October				196 (8-10-28)	42 (7-10-28)	

It will be seen that Vittal has comparatively few malaria admissions, not more than 800 on the average per annum, while Puttur, Beltangadi and Sampaje have nearly 6,000, 10,000 and 5,000 respectively per annum. These figures however do not necessarily represent the actual state of malaria in the particular stations where the dispensaries are located, as they depend upon the respective populations and on the state of public health in the adjoining villages for a few miles around. But when the station under question can be shown from other evidences to be a comparatively healthy place, these same figures may serve the purpose of indicating the plausible unhealthiness, especially due to malaria, of the surrounding area from which people take to the nearest hospital for treatment.

Another feature that can be judged from the above table is the greatest prevalence of malaria in the months of May, June and July.

22. Yet another evidence of malaria is to be gathered from the vital statistics. This will be referred to later on under the description of individual circles or groups of villages as these figures are available only in some instances. Even so far as they are available, it is found that death-rates have always been in excess of birth-rates, a condition of affairs which requires very serious consideration.

24. Although the description of one village serves for the general features of all the others visited by us, there is such an endless variety even in the picturesque likeness that deserves mention in its bearing on the problem of malarial endemicity.

25. Subrahmanya. The first group of villages examined is situated in and around Subrahmanya at the south-eastern corner of the taluk. It is conspicuous for its gorgeous peak overlooking the Bisli Ghat and the well-known temple of Subrahmanya. It is also the centre of a great cattle-mart of the district, about 50,000 head of cattle being annually brought down the Bisli Ghat mainly from Mysore to a fair which is held just preceeding the great festival in the temple in the month of December. Closely adjoining the temple runs a stream which is perennial and joins lower down with the much more important and larger stream called the Kumaradhara so much so the village of Subrahmanya is surrounded with water on all sides. These two streams are the

chief sources of water for men and cattle and also for mosquitoes to breed in. In addition there are two or more small channels which take origin in the small hill slopes on the south and the waters of which are diverted for purposes of irrigation. Larvae of anopheles mosquitoes were found in fair numbers in the channels and fields fed by them. Reserved forests are more or less in contiguity with the row of houses which are built on the road which is the only thoroughfare leading to the temple. There is very little activity of any kind except during the festival occasion and the permanent residents are only those who have some kind of subsistence from the management of the temple.

Nalkuru, Guttigar, are two villages lying on the road leading towards the west from Subrahmanya. They are purely agricultural villages. It was represented that the growth of forests on three sides has led to the increased incidence of malaria. The hill streams are numerous and run on all sides of the villages.

Hariharapalladka is nearer the foot of the Ghats on the south-east. The village site extends well into the reserved forest areas. The Yenekal Hole flows by, besides the two streams that run on either side feeding the fields under paddy cultivation. The hill slopes consist of large arecanut plantations.

77 out of 95 children or 81% examined in this group of villages showed enlarged spleen. 9 out of 72 or 12% of the blood smears were found infected with parasites.

Kadaba, Kodimbala etc.

25. The villages under this group are situated about 14 miles slightly to the north-west of Subrahmanya. Except in the case of Nujibaltila and Ranjaladi, the country side is much more open. No hill streams are found running in the vicinity. Rainwater is stored in three tanks by putting bunds across the ridges and used for irrigation. They go almost dry in summer, but they leave sufficient swampy area riddled with pools to constitute a good breeding place for anopheles mosquito larvae. Larval collections were made from the tanks under question.

No. of children examined for spleen.	190	No. of blood smears examined.	75
No. with enlarged spleen.	97 or 51%	No. infected	6 or 8%

It is noteworthy that children amongst the Adi Dravida converts showed a smaller spleen rate than the caste boys and girls

in the Board schools. This was apparently due to the fact that Rev. Lobo, the priest, looks after them and administers quinine from his own resources.

26. Uppinangadi was formerly the headquarters of the taluk and claims a common village site. It is situated at the junction of the rivers Kumaradhari and Netravati and occasionally bears the brunt of the combined floods of the two rivers. The country around this town is fairly open and there are few streams in this area other than the two main rivers. It has a Board Higher Elementary School and out of 105 school and other children examined only 12 had enlarged spleen, giving a spleen rate of 11%. Only 2 slides out of 15 were found to contain malarial parasites; the parasite index thus being 13%. Almost all the children who showed enlarged spleen were permanent residents of the neighbouring villages or hamlets; and the majority of blood smears taken were from this lot. The mosquitoes bred out were mostly A. karwari, besides a few A. barbirostris and A. fuliginosus. Uppinangadi may therefore be said to be comparatively healthy from the point of view of malaria.

27. Hirebandadi, on the other hand is situated in the midst of low ranges of hills and has two streams and a number of irrigation channels. It is also a mile across from the Kumaradhari river on the south. 8 out of 22 children or 36% showed enlarged spleen and 4 smears out of 22 xxx or 18% were found infected with malaria parasite.

28. Golithattu. This is situated about 10 miles from Uppinangadi on the main road to Shiradi. The houses are as usual scattered about in groups of two or three, generally belonging to the same family at one or other end of the valley of green clad rice fields. There is a stream of moderate size and rather sluggish current flowing over a bed of gravel through dense vegetation on either side close to the P.W.D. rest-house. A search was made for anopheles larvae in this stream as well as in the numerous overflow channels from the rice fields; but the only species bred out from here were A. barbirostris and A. hyrcanus var. nigerrimus Not more than half a mile from the periphery of the village one meets with thick forest areas which are also to be noticed on either side of the main road. The population of the village as

per 1921 Census is 693 and the total number of deaths in 1928 were as many as 44 out of which 22 were from fevers; while the total number of births recorded for the year was only 18.

Kokkada is a small village about 6 miles from Golithattu and is the seat of a Roman Catholic colony. The church of the place serves for the congregation of more than 2,000 panchama converts spread over 12 to 15 miles round it in places like Sishila, Neriya, Kadaba, Kunthur, Uppirangadi and Kokkaradi, Shibaje and Kalanja where the mission have established elementary schools. The village proper is a collection of about 30 houses grouped on the road, a somewhat unusual feature in this country. It is placed between two hill-slopes and there is no water channel in its neighbourhood, wells being the only source of water-supply.

Bajathur is another small village midway between Golithattu and Uppinangadi and situated on the main road. The road from Golithattu to Bajathur passes through fairly thick forest with a small stream running along one side of it practically all the way through and eventually draining into the river Netravati. In marked contrast to Kokkada, Bajathur has a number of small channels to which most of the water from Golithattu ridge drains into the river Netravati near Bajathur.

One special finding in this village is the high parasite index and a great preponderance of quartan type of infection. 95 out of 132 children examined were noticed to have enlarged spleen, the spleen rate therefore working out to be 72% and out of 120 blood smears examined as many as 27 were found infected, out of which again 14 were of the quartan variety of the malarial parasites.

29. The next group of villages visited were Hatyadka, Sisila and Shibaje Hatyadka, on the bank of the Sishila hole, could be reached by a foot-path through 4 miles of thick forest on either side from a point, on the Shiradi main road, about 8 miles from Golithattu. Sishila hole is a typical hill stream noted alike for the rapidity of its current and the clearness of its water. On the edges of the river where it falls small bays and in the rock pools on the bed of the river a few A. listoni and a good number of A. karwari were found to breed.

Sishila is further up in the north about 5 miles from Hatyadka with Shibaje about half-way between the two villages. All these villages have dense forests in their close vicinity and also abound in arecanut plantations interspersed with cocoanut trees, chiefly

owned by the Chitpavan Brahmins.

There were in this group 41 cases of enlarged spleen out of a total of 50 children examined and 6 infected blood smears out of 40, the spleen rate and the parasite index working out therefore to be 82% and 15% respectively.

30. The Bangadi group of villages is situated in a valley close to the hills bordering Mysore and consequently abounds in a number of small channels all round. Some of these are bunded so as to divert the water to the rice fields. The ridges are all overgrown with low jungle.

The spleen rate is fairly high in this area. Out of 96 children in Indabettu, Bangadi and Kadirudayavara, 73 showed enlarged spleen (76%) and the parasite index was 16% (12 out of 76).

31. The next group of villages selected lie in the northern most boundary of the taluk. Mittabagilu is in a big valley at the foot of the Yelanēru ghats. There are numerous hill streams, watering the extensive rice fields in this valley and eventually joining the river Nētravati whose cataractuous origin in the Ghats can well be seen from the plain below.

Malavantiga is just at the foot of the hills and has a number of arecanut gardens interspersed with cocoant groves. The dwelling houses are situated in groups of two or three at the foot of the hills within these groves. The country around this group of villages is a little more open and commands better facilities for natural drainage than the Bangadi group.

This possibly explains the slightly lower spleen rate which was only 64% (28 out of 44). The parasite index was 14% (6 out of 42). The mosquitoes bred out from this area were A. karwari, A. barbirostris and A. hyrcanus.

32. Neriya is in the centre of a thick forest area interspersed with small valleys where rice is grown. Alongside these paddy fields and on the slopes of the hill, groups of huts are scattered about. The banks of the principal streams of this place, Aneru Hole and Neriya Hole, are rich with arecanut and cocoanut gardens. Here too the practice of bunding the streams to divert water to the gardens is in vogue. In small pools and bays formed on the edges of the streams overgrown with grass and weed, anopheles

larvae were found in great numbers. The species bred out were A. listoni, A. karwari, A. fuliginosus, A. hyrcanus var. nigerrimus and A. barbirostris.

In Thotathadi about 5 miles from Neriya two brothers aged about 14 and 12 were found to have enlarged spleen which filled practically the whole of the abdomen in the case of the elder brother and nearly three-fourths of it in the case of the younger ~~brother~~ one. The former had numerous benign tertian and malignant tertian parasites in his blood. 70 ..

The recorded births and deaths in Neriya speak for themselves as to the intensity of the disease in this area.

Year.	Births.	Deaths.	Deaths due to fever.
1927	28	51	48
1928	22	53	46

The spleen rate was very high as many as 73 children out of 80 or 91% having enlarged spleen, and 12 out of 80 or 15% blood smears were found infected.

33. Charmadi, Kokkinje and Chibidre villages are all situated on the main road from Beltangadi. Charmadi is only 7 miles from the foot of the Ghat.

There are no features of distinctive interest in this group except that the spleen rate is among the highest being 86% (52 out of 60) although the parasite index is comparatively low 8% (4 out of 52).

34. Mundaje is about 5 miles from Charmadi and the village is situated on the slope of two ridges in the hollow between which the Mundaje hole winds its way on a bed of rock. There are about 24 streams running down the ridge on either side and draining into the central stream. These streams run through thick vegetation and were found to breed A. listoni, A. karwari in no inconsiderate numbers. The main stream has as many as eight bunds in its course so as to divert the water on to arecanut gardens. There are numerous channels dug along the gardens particularly in those belonging to Mr. Khadlikar which were all found to breed anopheline larvae although at the time of our investigation they were all A. karwari, a non-carrier species. The physical features of this area, such as its dense forests, numerous hill streams and thick vegetation are most favourable for a high malarial endemicity. But some of the people are alive to their own peculiar conditions and without entirely giving way to a general

feeling of general helplessness are taking to quinine as a means of remedy. This has had some definite influence on the spleen rate in the children. Mr. Bhide, an influential lanlord in the village and a taluk board member, has been stocking quinine with him every year for the use of his tenants and relations. The Brahmin school children who were resorting to the use of quinine in case of need had a much lower spleen rate than the children of other castes. If, therefore, in addition to this stock of quinine more of Government supply was made available in this village with some important local men like Mr. Bhide himself, a more perceptible effect on the spleen rate may be noticed in a few years. It is a pity that the rural dispensary opened here with the generous financial assistance of this gentleman had a shortlived existence mainly due to difficulties in getting a suitable medical practitioner to settle down here.

96 children were examined in this area out of whom 68 had enlarged spleen (71%) and the parasite index was 10% (6 out of 60).

35. Dharmasthala is an important place of pilgrimage attracting about 12,000 pilgrims during the annual festival in the month of December. The country around is thrown into a series of ridges thick with forest and rice fields in the narrow valleys between the ridges. In one such valley the temple of Dharmasthal is built and there is a well-formed row of houses to the east of the temple. To the west of the village there is a small reservoir about 100 ft. square into which water oozes from a tank higher up between two hill ridges completely covered over with dense forest. A pipe leads off from the reservoir to the village where the water is supplied by means of stand pipes. Opposite to the temple are two marshy depressions. The water in one of them was too foul for any life to be present, whereas the other one was in use for washing and bathing. To the north, but separated from the temple area by a small ridge, is a tank which is inaccessible consequent on the thick growth of forest all round. There are two seepage channels from this side, which are bunded off for diverting the water to rice fields. Here are extensive lands mostly belonging to the temple which are left fallow for want of cultivators who can live in the land and prevent depredations from

wild animals. There is an Ayurvedic dispensary maintained from the temple funds and it shows a good record of attendance as given below:

Month.	Total admissions.	Fever admissions.
October 1927	115	56
November "	180	107
December "	154	90
January 1928	167	93
February "	375	188
March "	228	129
April "	274	153
May "	204	114
June "	160	84
July "	293	199
August "	249	175
September "	238	138
October "	143	69
November "	181	127
December (upto 18th)	136	84

It is obvious from the above table that the fever season commences sometime in February and lasts till August. This Ayurvedic dispensary stocks a small quantity of quinine for use in cases of malaria, although it is hardly enough to meet the great demands of the village. It may be useful to secure the co-operation of the Doctor in charge of this Dispensary to popularise the use of quinine.

Nidle is about 4 miles from this place and on the opposite bank of the stream of its own name. It is placed amidst very dense forest and almost every child showed a greatly enlarged spleen.

The anopheles mosquitoes bred out from this area belonged to the following species: (1) A. subpictus. (2) A. vagus. (3) A. hyrcanus var nigerrimus. (4) A. fuliginosus (5) A. pallidus. (6) A. karwari. (7) A. jamesi and (8) A. jeyporiensis.

The total number of deaths in 1926 was 81 out of which 68 were due to fevers; in 1927, 32 deaths out of a total of 50 were due to fevers; whereas in 1928 as many as 75 out of 92 deaths were attributed to fevers. The births recorded for this period were 36, 46 and 38 respectively.

Out of 106 children examined in this group of villages 96 had enlarged spleen (91%) and slides 12 out of 90 were found infected (parasite index 13%).

36. Ujre is a small town of 2,705 inhabitants lying in the middle of an expansive open tract of country. It is a fairly dry plain with but one channel the water of which is used for the purposes of irrigation especially during the off season.

The spleen rate and the parasite index were 19% and 10% respectively

(20 out of 105 and 4 out of 40).

37. Laila, Kudu, Kaiyadi and Kayur serve to exemplify the peculiar conditions prevalent in parts which are strictly rural, in contrast to those obtaining in areas which are more or less urbanised. Laila which in particular is but two miles distant from the town of Beltangadi shows a fairly high spleen rate.

Whereas in the rural parts the spleen rate and parasite index were 72% and 10% respectively, the corresponding figures for the adjoining town of Beltangadi were 16% and 1%. Possibly the greater extent of open country around Beltangadi accounts for the difference.

38. A low spleen rate (6%) was also to be noticed in the rural parts of Kadyar and Guruvayankere but these again are entirely open.

39. Puttur, the headquarters of the talu. is again comparatively healthy, only 12 out of 494 children having enlarged spleen. A few of these latter again reside in neighbouring rural parts. None of the 20 smears examined showed any malarial parasite.

40. In the area to the west of Puttur, Vittal, a small town of 3,978 inhabitants and the rural parts of Kapu and Punnaicha were visited for purposes of comparative study although they were said to be non-malarious. They are very much farther removed from the Ghats: they have great deal of open country around them and very little of reserved forests closeby: they are in addition comparatively drier.

The spleen rate in Vittal was only 0.5% (1 out of 248) and in the rural parts out of 116 children examined none had enlarged spleen. 12 and 24 blood smears were taken in the urban and rural areas respectively and examined. None of them showed any presence of any malarial parasite.

41. The next group of villages visited consisted of Bellare, Kalanja and Aivarnadu. The two former have much less of forest areas around them and to that extent have a lower spleen rate than in the last village which is situated amidst dense forests. Numerous small streams course their way on beds of laterite rock on 3 sides of Bellare and in them as well as in a rock pool on the way to Aivarnadu larvae of A. Karwari were found to breed. The births and Deaths register reveal the following figures for

Bellare and Kalanja for the year 1928.

	Deaths.	Deaths due to fevers.	Births.
Bellare.	47	38	42
Kalanja.	35	32	24.

The total spleen rate in this area was 37% (30 out of 80) and the parasite index 9% (4 out of 47).

42. Sullia is a village on the main road to Coorg and Mysore about 22 miles from Puttur. It has a dispensary the medical officer in charge of which attends also to the regular administration of quinine to every schoolboy in the Board School on one day in the week. The physical features of Sullia are very nearly akin to the next group of villages to be described with its dense forest and numerous hill streams. And yet on account of this quinine parade, not more than 6 out of 65 Board school children had enlarged spleen, while in the Panchayat school of the same village 8 out of 1[illegible] children were found to have their spleens enlarged. The latter figure is perhaps too small for purposes of comparison: but yet the percentage is so obviously high as will more than compensate for any such fallacy. The President of the Panchayat Board brought it to my notice that the Government had recently ordered the clearing of forest areas for a distance of about 2 furlongs from the outskirts of the village, but the Forest Department had not shown any inclination to give effect to the order. If that were so, it is upto the Government to set matters right which will go a great deal to minimise the incidence of malaria in this locality.

43. The last group of villages visited consists of Aranthode, Thodikana and Sampaje. The river Payaswani, which takes its origin in the Coorg ghats with its tributary streamlets, skirts the southern borders of the taluk past these villages until it passes on to the neighbouring taluk of Kasaragod. Dense forests and rising hills come into view as one proceeds from Sullia to Sampaje which is on the border land between Puttur and Coorg. Aranthode is on the main road midway between Sullia and Sampaje while Thodikana is about 5 miles to the west from Aranthode and could only be reached by a foot path through thick forests. Rice is largely cultivated in the valleys between the hills and Arecanut gardens are also in abundance. The crops are however subject to a great deal of denudation by the wild animals that haunt the neighbouring ghats. There is a dispensary at Sampaje which the local residents fear may get closed on account of lack of [illegible]

at the hands of Government. It caters to a large number of inhabitants of not only Puttur taluk but also of the neighbouring village of Coorg Sampaje. On this account the province of Coorg is contributing its share towards themaintenance of the dispensary and it will be therefore ill advised if its closure is brought about.

It was understood that Aranthode was being regularly visited by the Medical Officer at Sullia till recently; but by a Board's order this arrangement was stopped on the ground that a dispensary had been opened at Sampaje and that people from Aranthode would go to the latter place for treatment. But unfortunately Aranthode is as distant from Sampaje as it is from Sullia ~~or Sampaje~~ and orders should be restored for the medical officer of Sullia or Sampaje, paying periodical visits to Aranthode and if possible to Thodikana with a stock of the more important medicines including quinine chiefly.

/This group of villages is fairly highly malarious the spleen rate being 64% (167 out of 262) and the parasite index 11% (9 out of 84).

44. Discussion and recommendations: In the first place malaria is claimed to be comparatively of recent prevalence and coeval with the overgrowths of forests too close to human habitations. Indeed wherever one went one heard from all quarters, educated or otherwise, that malaria was due to the foul air that emanated from the decaying shrubs and leaves in the dense forests during the dry weather. The more enlightened among the public who lay faith in the connection of mosquitoes with malaria contend that the foul air so depresses the vitality that the people fall an easy and ready prey to the disease. Such prejudices and beliefs exist everywhere with respect to every other disease, and although they may not merit serious consideration by themselves, the facts on which they are based, namely, that the disease is of recent prevalence as also the extension of reserved forests deserve attention.

45. Reviewing similar conditions in the adjoining province of Coorg, McCombie Young in his report on malaria in Coorg concludes that "malaria is no new disease in Coorg and that there is no reason to believe that recent adverse economic causes have exacerbated what is probably an agelong endemic prevalence," and that

that the slight increase in recent times "may well be attributed to the mistaken drainage policy adopted in Mercara and to an increase in the activity of the prevalent endemic disease of the country as an aftermath of the influenza epidemic of 1918." It may well be that closely similar factors have been at work in Puttur taluk also.

46. Again it is to be borne in mind that any material change in the economic well-being of any community is likely to have its repurcussion on its general health. In recent years, the enormous rise in prices of even the very ordinary necessaries of life without a corresponding rise in the income of the wage earner, must have brought about a condition of economic decadence which made it hard for the larger masses to withstand the onslaughts of disease. As individuals fell ill and suffered, they lost not only the present earnings, but also the capacity to earn in course of time. A vicious circle was thus established. This set back to the economic prosperity might well be responsible for the increased activity of the disease, part of which may have also been imported from the adjoining provinces of Mysore and Coorg on account of the increased means of communication and facilities for transport in recent years. There have always been extensive trade relations between this area in South Canara on the one hand and Mysore and Coorg on the other, more especially in arecanut and cardamom. More than all, the movements of vast masses of the population to and back from the several festival centres in the taluk have not a little contributed to the general spread of fevers.

47. These explanations notwithstanding, the growth of the forests can by no means be considered to play an unimportant role in the increased intensity of the disease. They, more especially the jungle and low shrub in the proximity of human dwellings, afford nice shade and shelter for mosquitoes which breed in small collections of water in the adjoining streams and seepage channels. In any case the extension of forests right into the village sites is no doubt to be regarded as an enemy to be got rid of and it follows obviously that clearances should be encouraged and stimulated in every possible way, in so far at least as the said rank jungle and bush do not encroach right on to the dwelling areas. They are certainly responsible for the denudation of crops and deprivation of cattle by wild animals besides being a not insignificant factor in the spread of malaria.

48. Puttur taluk can be divided into two well-marked areas as already stated, by a line drawn from north to south and passing through Puttur. The areas lying to the east of this line are malarious, its extent and severity varying in direct relation to the proximity of villages to the Ghats in the first place, the hill streams and seepage channels in the next place and to the density of forests and forest-growths in the third; whereas parts lying to the west of this line are comparatively healthy. The most plausible explanation for this is to be found in the comparative dryness due to smaller number of water courses and better drainage and again in the absence of forest or other jungle growths. The amount of malaria is thus apparently determined to be in inverse proportion to the extent of open country present around any area.

49. Subrahmanya, Neriya, Charmadi, Pengadi and Kampaje are among the worst infected villages lying as they are at the foot of the Ghats and riddled with numerous streams of diverse character. Dharmasthala is easily the worst affected area, although it is not situated at the foot of the Ghats. Its malariousness is determined more by its position in a valley surrounded by low ridges of hills and covered with dense forests and by the absence of facilities for effective natural drainage.

50. The uncultivated ridges of laterite rocks in general are thick with low jungle which afford shelter to the mosquitoes by day. Low jungle is greatly to be met with in the sub-ghat regions and it is these areas again that have also thick reserve forests rendering it difficult therefore, to apportion their individual importance from the point of view of malaria. However it is a measure of great importance that some amount of deforestation has got to be done for a distance of at least two furlongs from the outskirts of every village. Such clearing can be easily effected by issuing permits to local residents who would be only too willing to cut small trees and bush and also cultivate some crop on the clearings, as they seem to have been used to in former times.

51. The next and perhaps a more important problem to consider is the question of eradicating or at least minimising the propagation of the "carrier--mosquito." Such a consummation devoutly

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wished for, obviously depends upon the treatment which can be given to the water places which are legion in number and in almost all of which one or other species of anopheles mosquito were found to breed.

Obviously the tangled problems of malaria of a such hyper-endemic area as Puttur taluk cannot well be unravelled in the course of a few weeks' preliminary investigation. This should certainly be left over to a detailed and intensive investigation at a later date when the fever season is in full swing and the output of mosquito fauna is at its heigh What applies to Coorg may apply to Puttur also. "If one takes into account the nature of the country, its abundant rainfall, its warm and humid atmosphere, its hill streams, its valleys moist with seepage water and its abundant vegetation one is forced to the conclusion that it is not in our stars that the complete eradication of malaria from such a country can be accomplished and that control and mitigation rather than abolition should be the goal of antimalarial endeavour." (Mc.Combie Young) On account of such peculiar physical features, the problem of larvicidal measures is beset with a great many difficulties. Measures of subsoil drainage of all hill streams and seepages which it was possible for Sir Malcolm Watson to undertake in the Federated Malay States are hardly to be considered here on account of their huge financial involvement. Even surface drainage is impracticable on account of the vastness in the number of the rock-pools found in the beds of these hill streams whose meandering courses or currents of rapid flow serve to produce new erosions. Exactly the same conditions prevail in the channels diverted from the main stream by putting up anicuts for the purpose of irrigating the arecanut and other gardens. These channels are also in part overgrown with small shrub and weed on their margins which require clearing. Difficult as this task appears at first sight, a beginning may be made by joint co-operation of the richer landlords in the worst affected villages. Each of them may lend or pay for the services of a labourer or two for clearing all the rank vegetation on the margins of their private garden, channels and also periodically for draining or oiling all the stagnant collections of water such as rock-pools etc. Towards this end the authorities have to provide the necessary implements and technical advice which will be so essential for getting the best results.

52. Amidst such feelings of dark despair that seem to beset any attempts at antimalarial measures, there is however the ray of hope

arising from the amount of enthusiasm evinced by a good number of afflicted villagers to do something to eradicate this great thorn in their flesh. Some of the more influential landlords are even so philanthropic as to stock a supply of quinine with them for the use of their tenants in case of need. As has already been shown such villages as have had the benefit of a free use of quinine either at the hands of rich landlords, kind patels, or philanthropic missionaries show a definite diminution in their spleen rate in direct contrast to neighbouring villages or, in some cases, neighbouring parts of the same village. For instance in Kadaba the Adi Dravida children examined in their huts showed a spleen rate of only 3.5% while the caste school children in the same village had a such a high spleen rate as 45%. While the former were freely treated with quinine by Missionaries, the latter have nothing to do with them on account, presumably, of scruples of caste. Again in Mundaje, where a few rich landlords stock quinine which is generally made use of by their tenants, it was found that there was a very low spleen rate among them while other children showed a distinctly higher spleen rate. Lastly, the most convincing proof of the efficacy of quinine was available at Sullia, where children of the Higher Elementary School are reported to have a weekly parade of quinine treatment at the hands of the Medical Officer in charge of the Taluk Board dispensary. Out of 61 children examined in the school only 6 had enlarged spleen (10%). But out of 12 children in the Panchayat elementary school who receive no such quinine treatment 8 had enlarged spleen. Quinine thus being so useful requires a great deal of popularising by means of propoganda. More than that it should be made available in each village. The Government have already sanctioned a scheme for free distribution of quinine in this taluk and suggestions for the modification of the existing system of agency for distribution with a view to its better utility have already formed the subject of a special report to the Government. If they are given effect to, it is hoped that much good would accrue to the residents of the taluk.

53. Methods of personal prophylaxis, such as the use of a right kind of mosquito curtain and antimalarial hygiene have also to be popularised. It is gratifying to note however that one or

two landlords in the affected areas have agreed to the daily and proper use of mosquito curtains after being convinced of its beneficent uses.

54. Antimalarial measures of a permanent kind will be, it is feared out of place to a considerable degree. But whatever is practicable can only be devised when the carrier species of the anopheline mosquitoes can be more definitely incriminated. This has not been possible during the present investigation which was of a preliminary nature on account of the present season being nonfebrile and also of the paucity of the mosquito fauna. A second investigation of a more intensive kind will therefore be necessary during the fever season so that the problem of malaria in Puttur taluk can be studied in all its bearings and the carrier species also determined, where possible. It is proposed during that period to take up three or four highly malarious places and make an intensive study with a view to determine the nature of antimalarial measures that may prove to be of lasting benefit. Such a procedure will be of use in another direction as well. If in a place or two, it were possible to show definite relief from the distressing effects of the disease it will be a greater incentive for the neighbouring villages to adopt similar measures than any amount of theoretical discussion.

For this purpose, it is perhaps necessary to point out the advisability of visiting the area under question between the months of April and May next before the onset of South-west monsoons. At the same time the problem of malaria in the adjoining taluk of Karkal and in few other parts as specified in G.O.No.2353 P.H. dated 7th November 1928 may be taken up.

55. But apart from the second investigation during the febrile season, one feels the imperative need to adopt some measures, albeit of a temporary kind, to such areas as are the worst affected, namely, places like Subramania, Dharmasthala, Mundaje, Heriya and Sampaje. A gang of 3 or 4 coolies may be employed by the local board for each such village to look after the clearing of low jungle and of vegetation on the margins of garden channels and oil the stagnant pools along the source and on the bed of the hill streams. The question of cost should not be a matter of much moment for it should be possible to enlist the co-operation of the prominent landlords of these places and secure the services, as coolies, of 3 or 4 of their labourers for a

few months during the febrile season. In fact, in two at least of these areas, namely, Subramania and Dharmasthala which are the centres of big festivals the authorities of the temples who are actually responsible for the sanitary arrangements during the festivities may easily set apart a couple of hundreds of rupees for such antimalarial measures as may be found necessary. But it is decidedly essential that there is a fully qualified Medical Officer trained in Malariology who can go round these places, in regular succession and from time to time for not only advising, instructing and guiding the general operations, but also to popularise the benefits of quinine and look to its judicious distribution. It would appear that a Second Class Health Officer with a preliminary training under the Special Malaria Officer will serve best the object in view and one can be appointed as assistant to the District Health Officer, South Kanara. He should have specific duties to attend to the antimalarial measures not only in Puttur taluk but also in other malarial talukes of the district. He should be able to devote his entire attention more especially during the fever season so that he can arrange a detailed programme of work well in advance of the anticipated fevers and carry out such measures as are necessary in each area. He could also give popular lectures on personal prophylaxis and antimalarial hygiene, and arrange for the equitable distribution of quinine. He will also be in a position to take blood smears from fever cases, and examine periodically all water places for larvae and definitely incriminate the carrier species from time to time by dissecting adult mosquitoes caught from the households. In all these matters, he shall have the technical assistance and advice that may be needed at the hands of the Special Malaria Officer.

56. Summary. The salient features in this report and the opinions expressed therein are based upon an enquiry carried out in 30 villages and the inspection of water places in almost all of them for the presence of anopheles larvae and on the examination of 2,748 children for evidences of malaria in them.

(1) Puttur taluk can be divided into two areas one lying to the east of the line passing through Puttur from North to South

and the other to the west of this line. The former area is highly malarious while the latter area is comparatively healthy.

(2) The larger towns in the taluk which have a greater amount of open country around them and are removed further away from the reserved forests are also healthy, as for instance, Puttur, Vittal, Uppinangadi, Ire and Beltangadi.

(3) The submontaine regions and the places with dense reserved forests extending right into human habitations are the most highly endemic areas with a spleen rate of nearly 80% as in Dharmasthala, Hidle, Neriya, Subramania and Sampaje in the order of severity of the disease.

(4) The present season was afebrile as evidenced by the comparatively low parasite index and therefore a second and more intensive investigation in a few selected places is necessary.

(5) The predominant type of infection is the quartan variety of malarial parasite, which has so far been described in this Presidency only in Kanara and Cochin.

(6) The peculiar physical features of the country make it very difficult to devise and adopt permanent antimalarial measures.

(7) Greater reliance has therefore to be placed upon the free use of quinine, clearing of low jungle and of all marginal vegetation in the garden channels and oiling of all stagnant collections of water such as rock pools.

(8) Methods of personal prophylaxis have to be popularised.

(9) For all the above purposes, a Malaria trained Second Class Health Officer may be appointed as assistant to the District Health Officer, South Kanara. He can also attend to the malarial problems of other taluks of the district, but he should not be saddled with the general duties of a Health Officer.

(10) It is also necessary that the Government should arrange for and encourage and stimulate the clearance of forest areas, at least for a distance of two furlongs from human habitations.

(11) A large number of rural or other dispensaries especially in the interior and in the less easily accessible areas such as Mundaje, Neriya and Subrahmanya should be opened.

(12) The District Health Officer should arrange for some form of intelligence bureau for getting timely information of outbreaks of fever in the more important centres of population so as to direct the energies of his assistant in useful directions.

57. In conclusion, I take this opportunity to record our feelings of grateful thanks to Mr. Karant, M.L.C., and Mr. M. Siva Rao, President, Puttur Taluk Board, but for whose cordial and willing co-operation our work would have been rendered most difficult. Mr. Siva Rao helped us in various ways. He was mainly responsible for arranging a programme of work for us. He placed a host of headmasters and teachers employed in the local board schools under our disposal: and, in addition, he put us into communication with several rich and influential people in all the places we visited. It would be impossible in a report of this kind to thank individually the several gentlemen who made our tour and work as comfortable and pleasant as circumstances permitted. Special mention may however be made of the Bhides, Mr. Narayana Bhide of Mundaje in particular, who evinced the keenest interest in our work, Mr. Mangesh Rao, the headmaster of Beltangadi school, the headmaster of Uppinangadi Board school, and the village musiff of Neriya.

1. 2. 29.

B.A.,M.B.C.M.,D.P.H.(Camb).,
Special Malaria Officer, M a d r a s.

PRR.
1-2.

Malavra - South Kanara DEVELOPMENT DEPARTMENT.

To Under Secy.

25424

Please see Resolutions at ~~pages 4-5~~ on page 4 c.f. Resolution 1 relates entirely to the Revenue Department. As regards Resolution 2 it is not clear what action is required in this Department. This resolution also appears to be one concerning the Revenue Department. The file may therefore be transferred to Revenue for necessary action.

TO GOVT. SECY. 13/6/28

M.C.B.K.
29-5-28.

S.

They do not require any more land for cultivation. I should suggest Public Health for Resolution 2 (L.S.G.).

Dev. u.o. 0-35-I/28-1
31st May 1928.

A.McG.C.T.
30-5-28.

Revenue.

REVENUE DEPARTMENT

Survey - Resurvey - South Kanara District - Meeting of landholders - Resolutions.

To U.S.

The resolutions at page 4 c.f. may be perused.

2. Resolution No.2 concerns L.S.G. department (Public Health) and a copy of the same may be sent to that department as already suggested in the Development note above.

D.D.W.
7-6-28.

Rev .U.O.1943-E
12-6-1928.

~~Dev~~ L S G

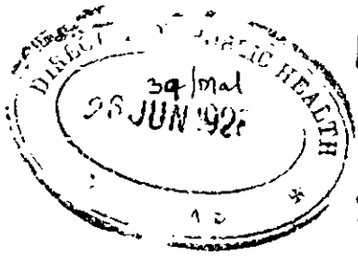
AV 13/6

"Extract of the Proceedings of the meeting of Landholders- Puttur taluk, South Kanara District, held at 4 P.M. of Monday the 14th May 1928 in the Taluk Board School, Mundaje, with Mr.K.R.Karanth, M.L.C., presiding.-

RESOLUTION.

"That as on account of the reserve forests and the increasing Malaria in such parts of the district like Mundaje the population is steadily decreasing and the economic and the health conditions are day by day becoming worse and worse and on account of the increasing difficulties of getting labour for purposes of cultivation properties are going fallow, this meeting requests Government to appoint a committee forthwith to investigate into the chief causes of these deplorable conditions and to suggest measures for their amelioration."

L.S. Gl P.H.) dept.



Please see the resolution below. The taluks of Kavkal and Uppinangadi ~~has~~ in the South Kanara Dt have been included in the scheme of free distribution of quinine in specially malarial tracts in the Presidency - vide G.O. 1059 P.H. of 14.5.28. The landholders of the Puttur taluk represent that malaria is endemic there and request that a committee may be appointed to investigate into the chief causes. The govt have appointed a Special Malaria officer for a period of two years to investigate the chief causes of malaria in a few selected places of high endemicity and to suggest ~~the officer has submitted a report on~~ to the govt and the local bodies concerned the remedial methods. The officer has till now completed nearly a year's work. ~~The investigation of the~~ Of the conditions in the area referred to in the resolution are so deplorable as represented, the D.P.H may be asked to instruct the Special Officer to investigate them. The D.P.H may be consulted n.o.

H
26/6

Lis Gen no 25424-D2 P.H Av.
21/6 22/6/28 19/6 Ind 19-6-28

Demand No. XXII.

P. 287.

1662. Mr. K. R. Karant.

To reduce the allotment of Rs. 11,43,000 for Public Health Establishments by Rs. 100/-

(To urge the need for the additional Health Officer to S.Kanara being put on Malaria duty).

SECRETARY TO GOVERNMENT
7- MAR. 1929
LOCAL SELF-GOVERNMENT DEPT.

Please see the report of the Special Malaria officer on malaria survey in the Puttur taluk, S.Kanara Dt. Attention is invited to the summary on pages 31 to 33 of in which the officer recommends the appointment of a Second class H.A. for malaria duty in the S. Kanara Dt. It is proposed that a more detailed survey should be carried out in the Puttur taluk and that specific anti-malarial measures should then be suggested. From the report it seems that free distribution of Quinine and clearance of forests near villages are the only practicable measures in the taluk. Puttur taluk has been included in the scheme of free distribution of Quinine. As regards clearance of forests the D.H.O. should be able to visit the villages which

are intensely malarial and submit suitable recommendations.

2. The necessity for the appointment of a Health officer to attend to malaria work can with equal force be pressed in the case of some other Dts. It seems unnecessary at present to consider the question of appointing officers to deal with this disease alone especially as there is no likelihood of local boards being able or willing to carry out their recommendations.

3. The report may be communicated to the P.T.B and he may be requested to take up the question of clearance of forests near dwelling houses. The D.P.H. may be asked to make recommendations in the matter. He can take up one village after another according to his convenience.

JFm
12.3.29.

12.3.29.

14.3.29

M 17/3

Ley

00
14/3

As to what the D.P.H has to say, he should

15.3.29

JFm
14/3

39

A copy of the note on pages 4 and 5 ante may be sent also to the D.P.N for his remarks. He may be requested to treat this as specially urgent

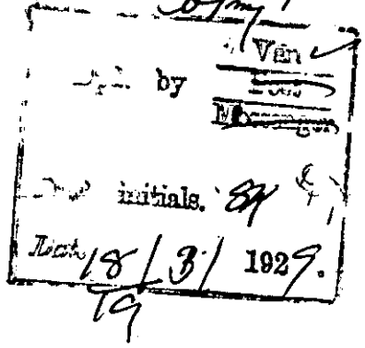
Sm
16.3.29

Wood
16.3.29

MB

DPP

DPP 1.7
L.S.R No 8691-10 P II
18-3-29



Office of the Director of Public Health,

R.No.39-3/Mal. Madras, 19th March 1929.

11279

SECRETARY TO GOVERNMENT
20 MAR 1929
LOCAL SELF-GOVERNMENT DEPARTMENT

The nature of antimalarial measures - quininisation of the population, the clearance of jungles in and around villages and oiling of breeding places - requires the presence of a trained man on the spot. The District Health Officer will no doubt be able to submit detailed proposals on the above matters, but, it will be impossible for him to actually direct the supervision of the operations which is an all important factor in the prevention and control of the disease. I am strongly of opinion that a Second Class Health Officer specially trained in malaria should be employed for the purpose and he will work under the general control and direction of the District Health Officer. The appointment will of course be conditional to the recommendations made by this Department being accepted by the Local Board. The statement that the necessity of the appointment may be applied with equal force to some other places cannot be a serious argument against the proposal. Mr. Karant may be told that his suggestion will be given due consideration.

Capt.,D.P.H.,
Ag. Director of Public Health,
Madras.

To

The Secretary tothe Government of Madras,
Local Self-Government Department,
Fort St. George, Madras. u.o.

SECRETARY TO GOVT.
26 MAR 1929
L.S.G. DEPT.

To L.S.G.

Please send a copy of the report to the Hon'ble Sly 27.3.29

Legislative Council Chamber,
Fort St. George, Madras.
25th March 1929.

12641

Dear Sir,

"Public Health - Report of the Special Malarial Officer on his investigations in the Putter Taluk of Kanara."

With reference to a recent question asked by Mr. J.A. Saldanha regarding the reports of the Special Malaria Officer on Malarial investigations, you were pleased to answer that if hon. Members from the districts asked for them they would be supplied.

You are aware that you were pleased to order the investigation in my district at my request, for which I am much obliged to you. I have tried to give every assistance to the Officer during his investigations in the district and I shall be thankful if you will kindly furnish me with a copy of his report so that I may take an intelligent interest in the matter, which is of such great importance to my people.

With kind regards,

Yours sincerely,

K.G. Kanara

To

The hon. Mr. S. Muthiah Mudaliyar,
Minister for Public Health.

S. S. for H.N. Dept

A draft D.O. is enclosed

9/42

H. S. Surplus Stock

D. O. No. 12641 - 1D2 Pkd 6/4/29.

Copied OK 8/4

Ref your D. O. ~~No. [illegible]~~ dated 25th March 1929 to the Hon'ble the Minister of Public Health regarding the Special Malaria Officer's report on his investigations in the Buttur taluk.

I am to enclose a copy of the officer's report for your information

Yours Sincerely

5.4.29

5.4.29

To

M.R.Ry K. R. Karuna Rao Avl
Tahsildar
(with report attached.
(Mufassal address)

Dpd. by Post
Dpt's. initials
Date 8/4 1929

Please see the notes on pages 4 and 5 ante and the remarks of the D.P.H. on page 7 ante. The D.P.H states that for the epidemisation of the population, the clearance of jungles and the oiling of breeding places a trained man is required. He urges that a Second class Health officer should be appointed.

2. The agencies so far sanctioned for the distribution of quinine are adequate at present. The scheme for the free distribution of quinine has been sanctioned only till the end of 1929-30. The question of making better and permanent arrangements for epidemic will arise only if the scheme is to be continued on a permanent basis.

3. It would seem that clearing of forests and oiling of pools etc can be attended to by a trained and experienced Health Inspector under the general supervision of the D.H.O.

4. As regards the D.P.H's statement at A on page 7 ante it is submitted, that the point is very important. If

an Second class Health officer is employed in the Puttur taluk to attend solely to malaria, other local bodies will press upon the Govt the necessity to appoint or midwife officers for dealing with special problems in their areas. The Tanjore D.B. has already asked for two special officers - one to deal with Cholera and another with fairs and festivals centres. The Govt now employ officers (in the mufassal) to deal with sanitation in general. It does not seem advisable to depart from this policy in a single instance without examining the ultimate liability involved. Just now the necessity has not become acute. Local bodies have first to take up schemes and provide funds to carry them out.

The requests have been refused.

Vide 12/4

5. The report on pages 3 to 33 may be communicated to the ~~D.B.~~ Puttur Taluk Bd. ~~Bd~~ may be requested to obtain specific proposals from the D.B.O. (vide B on page 7 ante) and to consider the question of employing Health Inspectors and manual staff required to carry out the proposals.

A draft order is submitted. 12/4

Sm.
11/4/29.

12.4.29

45

Sectt. II-5 (a)—48,004—6-11-28. (6)

G-S. (Lep H) DEPARTMENT.

	Date.	Initials.
When received for Fair-copying.		
When copied ..	15/4	by
When examined	15/4	ow
When signed ..		
When despatched ..		

50/15.4

READ AGAIN G.O. No ..... , dated 192

" " " " ..... " 192

READ ALSO:—

C. No. 8691 From the D. P. H. R., No. 39-2 Mal dated 1-3-1929.

" " ..... " " D. P. H. R. No 39-3 Mal " 19-3-1929.

" " ..... " " ..... " ..... 192 .

ORDER.

No. 1015 , dated 15-4- 1929.

2/5/17 Mis

The report of the Special Malaria Officer on malaria survey in the Puttur taluk, South Kanara Dk, is communicated to the Puttur Taluk Bd.

2. The Dk Health Officer, South Kanara should prepare submit detailed proposals to combat malaria in the villages which are seriously affected by the disease. He should take up the villages in the order of urgency

and submit his proposals to the P. T B Puttur through the P. D. B S. Kanara. on receipt of ~~collected~~ individual proposals the Taluk Bd Board immediately consider them and take up the question of providing funds and of employing Sanitary Inspectors and menial staff required to carry out the schemes.

3. The P. T B is requested to submit a report by 1st August 1929 showing the action taken in the matter.

11.4.29.

12.4.29

(2)

16/4/29

To

The P. T.B. Puttur through the P.D.B.S. Kanara } Copy of the above with Copy of the letter cited

The D.P.H